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ABSTRACT

Findings from a study designed to evaluate the Houston Independent School District's (HISD) program for identifying students at risk of dropping out are presented in this report. In the 1988-89 school year HISD employed a scheme of four state-mandated criteria for identifying at-risk students, and this scheme's performance in predicting actual dropouts is assessed. Also examined are four alternative methods for stratifying the identified at-risk populations into groups that can be ranked according to within-group dropout rate. These methods are explored as possible ways to improve dropout prediction accuracy and consequently to identify a priority group for intervention purposes. Results show that in terms of annual dropouts, the state-mandated criteria overidentify students as potential dropouts and fail to identify many potential dropouts. The highest degree of predictive reliability was obtained by individual examination of the 15 combinations of the 4 criteria. The recommendation is made to explore further methodologies for making the best use of the criteria and to expand the list of at-risk criteria. Eight tables are included. (LMI)

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Making the Best of State-Mandated At-Risk Criteria

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Introduction

This study was undertaken as part of an evaluation of the Houston Independent School District's program for identifying students at-risk of dropping out. In the 1988–89 school year, Houston ISD employed a scheme of four state-mandated criteria for identifying at-risk students. Specifically, an examination of how those criteria performed in predicting which students would actually drop out was undertaken. The study also examines four alternative methods for stratifying the identified at-risk population into groups which can be ranked on within-group dropout rate. These methods are explored as ways of increasing the accuracy of dropout prediction for students identified as at-risk and, consequently, identifying for intervention purposes a priority group of at-risk students of manageable size.

Background

In 1989–90, rosters listing students considered to be at-risk of dropping out were distributed to each HISD campus. To fulfill the state mandate (Education Code Section 21.557) which specifies criteria for identifying at-risk students, the rosters were based on the following district interpretation of the criteria:

1) Overage for grade, as an approximation for retention (one year at elementary grades and two years at secondary);
2) Two years or more below grade level on Metropolitan Achievement Test (MAT6) Reading or Math, the district-wide norm-referenced achievement test;
3) Failed any subtest of the Texas Examination of Academic Minimum Skills (TEAMS), the state minimum skills test battery; or
4) Failed two or more basic subjects/courses last year.

Feedback on the At-Risk Rosters from campus and at-risk program staff indicated that the resulting undifferentiated at-risk pool was simply too large. The state-mandated criteria could not permit identification of meaningful targets for intervention in a school district where 40.6% of the 77,660 secondary school enrollment was considered to be at-risk.

Concerns regarding these state-mandated criteria were voiced in at least one other urban area in the state as well. In Austin, Frazer and Wilkinson (1990)* concluded that small percentages of the students classified as at-risk by the state criteria actually drop out and that the criteria correctly predicted only 40% of their dropouts.

In response to these criticisms of how the state at-risk criteria perform, the district piloted a method for producing prioritized lists of at-risk students at selected campuses during March of 1990. These prioritized lists sorted students by number of applicable state criteria as an approximation for "degree of risk."

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* Frazer and Wilkinson (1990, April). *At-Risk Students: Do We Know Which Ones Will Drop Out?* Paper presented at the annual meeting of the American Educational Research Association, Boston, MA.

Design of the Inquiry

The investigation was designed to provide answers to the following research questions:

Research Question 1: How well do the state-mandated at-risk identification criteria perform in predicting which students would drop out?

Research Question 2: What does discriminant function analysis tell us about the state criteria?

Research Question 3: How well do rosters sorted by number of applicable criteria identify a highest at-risk subset from the at-risk population (Number of Applicable Identifiers Method)?

Research Question 4: How well does the single highest-ranked criteria identify a highest at-risk subset from the at-risk population (Single Ranked Identifier Method)?

Research Question 5: How well does any combination of the four state at-risk criteria identify a highest at-risk subset from the at-risk population (Combinations Method)?

Research Question 6: How well do the four methods examined in research questions 2 through 5 above compare in terms of producing a highest at-risk subset?

Limitations of the Study

Because of the availability of data, this study was limited to analysis of dropout prediction on a *per annum* basis, that is, it examines how well the state-mandated at-risk criteria performed in identifying students who actually dropped out during the school year for which the roster was issued.

Also, analyses of Houston ISD's at-risk identification criteria in terms of its success in predicting annual dropouts were limited to grades 7 – 12. Since this is the only group of students that Houston ISD considers when reporting dropouts, it provides the only measure of the at-risk criteria.

Procedures

Techniques used by Frazer and Wilkinson (1990) in their study of state at-risk criteria performance in Austin ISD, particularly analysis of combinations of state prediction criteria and the notion of subjecting those criteria to discriminant function analysis, provided direction for this examination of at-risk identification in Houston.

Results

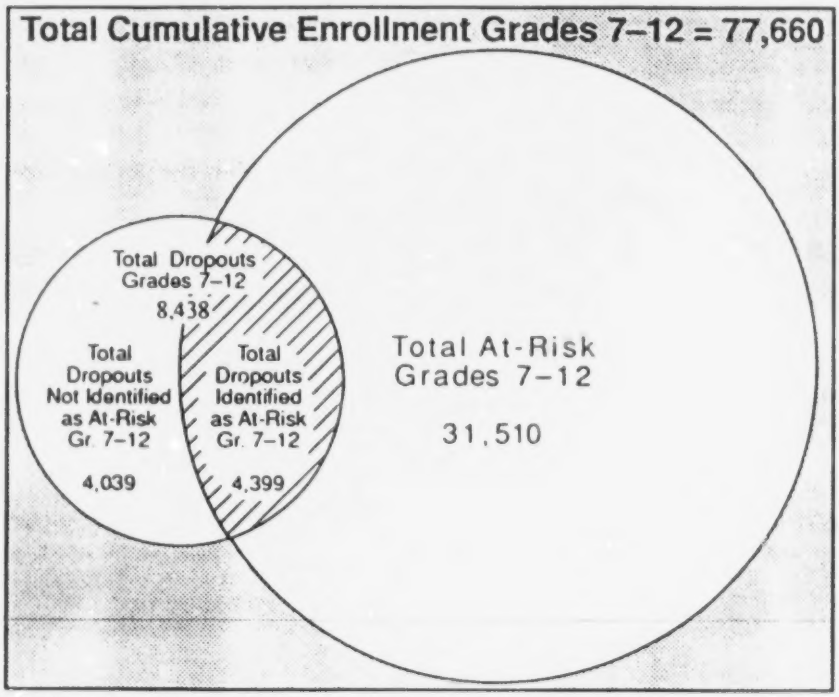
Research Question 1: *How well did the state-mandated at-risk identification criteria as applied in 1988–89 perform in predicting which students would drop out during that year?*

In examining how well the state-mandated at-risk identification criteria as applied in 1988–89 performed in predicting which students would drop out during that year, the study compared the number of students grades 7 – 12 who were identified as at-risk of dropping out in 1988–89 to the total district enrollment for that year (a "snapshot" of at-risk students compared to a cumulative count of the year's enrollment). The study also looked at how many of those students identified as

at-risk actually dropped out and how many actual dropouts were not accounted for by the state at-risk criteria. Dropout rates for at-risk and not at-risk groups were compared to each other and to the rate for the total district grades 7 –12 as a perspective on the overall reliability of the state criteria. Finally, the study examined how these criteria were translating into percentages of individual campus enrollments identified as at-risk.

Table 1

At-Risk and Dropout Students as Subsets
of the Total HISD Secondary School Population*



* Note that a "snapshot" of at-risk students is compared to a cumulative count of the year's enrollment.

As indicated in Table 1, the state criteria identified close to half (40.6%) of HISD's secondary school population as students at-risk of dropping out. Only 4,399 (13.9%) of the identified students actually dropped out. The state criteria accurately identified only half (52.1%) of the actual dropouts in as students at-risk of dropping out.

Table 2

Percentage of Campus Enrollments Identified as At-Risk*

Percent of Enrollment At-Risk	High Schools n = 30		Middle Schools n = 35		Elementary n = 168		Total HISD	
Over 50%	13	(43%)	0	(0%)	0	(0%)	13	(6%)
35% to 49%	10	(33%)	18	(51%)	25	(15%)	53	(23%)
25% to 34%	1	(3%)	8	(23%)	99	(59%)	108	(46%)
15% to 25%	1	(3%)	7	(20%)	36	(21%)	44	(19%)
Under 15%	5	(17%)	2	(6%)	8	(5%).	15	(6%)

* Figures do not include the 5 alternative schools.

Table 2 shows that most HISD campuses are forced to contend with large percentages of their enrollments at-risk. In fact, 75% of the campuses received At-Risk Rosters containing roughly one-third or more of their entire student enrollments. Over-identification of at-risk students is particularly acute at the high school level. Nearly half of all HISD high schools (43%) have over half of their entire student populations at-risk of dropping out.

Research Question 2: *What does discriminant function analysis tell us about the state criteria?*

The state at-risk criteria were subjected to discriminant function analysis to determine whether this method could offer not only an additional statistical method of identifying a highest at-risk subset of Houston ISD's at-risk population but also whether the stepwise (Wilks) method of variable inclusion could provide additional insight into the significance of each of the four criteria.

Each of the four state criteria were entered into the analysis in a stepwise fashion (Wilks' method based on the relative discriminating power of each variable) to produce a prediction that weighted the combined effects of each variable. The Wilks method showed all criteria to be statistically significant ($p < 0.00001$) with the exception of MAT6 Reading subtest scores.

Table 4

Comparison Results from Discriminant Analysis of Dropouts
Using State Criteria as Continuous Variables

Actual Group	Number of Cases	Predicted as Non-Dropouts	Predicted as Dropouts
Non-Dropouts	27,125	15,480 57.1%	11,645 42.9%
Dropouts	4,385	1,840 42.0%	2,545 58.0%
Total	31,510	17,320	14,190
Dropout Rate for Predicted Dropout Group = 17.9%			

As Table 4 shows, 18,025 at-risk students were correctly grouped as dropouts or non-dropouts (57.2% accuracy) from among the 31,510 total cases grouped (the total number of at-risk students). The discriminant function analysis identified a total of 14,190 potential dropouts (45.0% of the at-risk population) with an accuracy rate of 17.9%.

Research Question 3: *How well do rosters sorted by number of applicable criteria identify a highest at-risk subset from the at-risk population (Number of Applicable Identifiers Method)?*

The study examined, in terms of group size and within-group dropout rate, each of the four groups that resulted from a sort of students by number of applicable criteria to determine how well sorted rosters, such as those HISD piloted in March of 1990, could identify a highest at-risk subset from the at-risk population.

In producing the pilot rosters, at-risk students were sorted by the number of at-risk criteria that applied to each student (regardless of which criteria they were). Students identified on all four state criteria fell at the top of the roster, students with three criteria came next, etc. In sorting students by number of applicable criteria, the district's pilot at-risk rosters were presumed to indicate risk priority.

Table 5

Secondary At-Risk Students by Number of
Applicable State Identification Criteria

Number of State At-Risk Criteria	Number of Students	Percent of Total At-Risk	Number of At-Risk Dropouts	Percent of At-Risk Students Who Dropped Out
1	16,089	51.1	1,872	11.6
2	9,288	29.5	1,290	13.9
3	4,532	14.4	855	18.9
4	1,601	5.1	368	23.0
TOTAL	31,510	100.0	4,385	13.9

As Table 5 shows, this ranking appears to demonstrate some success in addressing the problem of over-identifying at-risk students to the extent that fewer students (perhaps a more manageable number in terms of intervention resources) are targeted as highest at-risk with a slightly stronger predictive accuracy.

This ranking offers a higher success rate in predicting actual dropouts (23.0% for students with four criteria as compared to 13.9% for the total at-risk population, an increase of 9.0% in predictive power).

As the number of applicable criteria goes up (from one to four), the more students in each group are correctly identified as potential dropouts. The intuitive validity of ranking students on

number of applicable state at-risk criteria appears to have merit to the extent that the dropout rate for at-risk students correlates positively with the number of state criteria on which they are identified.

Research Question 4: *How well does the single highest-ranked criteria identify a highest at-risk subset from the at-risk population (Single Ranked Identifier Method)?*

To determine how well each of the four state at-risk criteria performed independently from one another, the study looked at how large a subset of the at-risk population was identified by each criteria and what percentage of the dropouts who had been identified as at-risk fell under each criteria.

The study looked at groupings of students who were identified on each of the four state at-risk criteria regardless of which other criteria (if any) also applied. The groups included duplicated counts of students. For example, all students who were overage were considered together as a group.

Table 6

Students Identified as At-Risk by Each of the Four State At-Risk Criteria
(Duplicated counts)

State At-Risk Criteria	Number of Students	Percent of Total At-Risk	Number of At-Risk Dropouts	Percent of At-Risk Students Who Dropped Out
Overage	14,797	47.0	3,248	22.0
Failing Coursework	11,119	35.3	1,765	15.9
Failing Any Subsection on TEAMS	13,330	42.3	1,992	14.9
Below Grade Level on MAT6	15,419	48.9	1,484	9.6

As Table 6 shows, students identified as Overage for Grade (regardless of whether or not they also had additional at-risk factors) had a noticeably higher dropout rate (22.0%) than other at-risk students.

Research Question 5: *How well does any combination of the four state at-risk criteria identify a highest at-risk subset from the at-risk population (Combinations Method)?*

Dropout rates for students classified as at-risk on the basis of each of the fifteen possible unique combinations of the four state at-risk criteria were calculated to determine how well each specific combination of criteria identified actual dropouts.

Each of the fifteen possible combinations of the four state criteria yielded a discrete subset of the at-risk population with a unique dropout rate. These rates were taken to be indicators of the predictive reliability of the subsets prescribed by each combination. The subsets were then ranked on within-group dropout rate.

Table 7

Students by Combinations of State At-Risk Identifiers
Sorted by Dropout Rate

	State At-Risk Identifiers*	Number of Students	Percent of Total At-Risk	Number of At-Risk Dropouts	Percent of At-Risk Students Who Dropped Out
Group 1	O T F	892	2.8	288	32.3
	O T	1,747	5.5	464	26.6
Group 2	O F	1,435	4.6	333	23.2
	O T F B	1,601	5.1	368	23.0
	O	5,052	16.0	1,150	22.8
Group 3	O F B	1,220	3.9	230	18.9
	O T B	1,430	4.5	254	17.8
	T F	750	2.4	117	15.6
	O B	1,420	4.5	161	11.3
Group 4	F	2,730	8.7	243	8.9
	T	3,485	11.1	306	8.8
	T F B	990	3.1	83	8.4
	F B	1,501	4.8	103	6.9
Group 5	T B	2,435	7.7	112	4.6
	B	4,822	15.3	173	3.6
	TOTAL	31,510	100.0	4,385	13.9

* O = Overage for grade (2 years)
T = Failing any subtest of TEAMS
F = Failing coursework
B = Two years or more below grade level on MAT6 Reading or Math

As Table 7 shows, this breakout of the secondary at-risk population produces a subset with a higher dropout rate than any subset produced by any other method (32.3% for Overage in combination with Failing Teams and Failing Course Grades). A sorting by dropout rate provides some insight into the four state identifiers in terms of variance and reliability. Overage for Grade and Below Grade Level on MAT6 (O and B) cluster toward either end of the continuum as respectively the strongest and weakest of the identifiers. The other two identifiers (T and F) show the greatest variance as they spread more evenly across the range of dropout rates.

Table 7 also suggests a strategy for grouping clusters of criteria combinations along natural break points into subsets of manageable size which in effect prioritize the identifications in terms of accuracy in prediction.

Research Question 6: *How well do the four methods examined in research questions 2 through 5 above compare in terms of producing a highest at-risk subset?*

In order to determine which of the four selection methods produced a subset that maximized the concentration of dropouts and minimized the size of the target group, the highest at-risk subsets that resulted from each method were compared in terms of size, dropout rate, and

proportion of actual dropouts identified. The purpose of this comparison was to see if any of the four methods suggested an improved strategy for prioritizing at-risk identification.

Table 8

Comparison of Classification Methods for At-Risk Students
Based on State-Mandated Criteria

Subset Selection Method	Number of Students in Top Rated Subset	Dropout Rate	Percent of Total At-Risk in Subset
Discriminant Function Analysis	2,545	17.9%	45.0
Number of Applicable Identifiers Method (All Four State Criteria)	1,601	23.0%	8.4
Ranked Identifier Method (Overage)	14,797	21.9%	74.1
Combinations Method (Highest Ranked Combination of the Four State Criteria)	892	32.3%	6.6

Table 8 shows that each of the four methods yielded a predicted group (or groups) of students whose dropout rates were higher than the at-risk population as a whole. However, the highest predictive accuracy for a subset of the at-risk population was obtained by examining individually the fifteen combinations of the four state at-risk criteria. Of the four subset identification strategies examined in this report, the one that appears to offer the most promising technique for identifying reasonably-sized groups with the highest probability of accurately predicting actual dropouts is the examination of unique dropout rates for each possible combination of the state criteria.

Summary and Conclusions

Findings of this study may be summarized as follows:

1. When examined in terms of annual dropouts, the state criteria are over-identifying students as potential dropouts and failing to identify many of the actual dropouts. In 1988–89, the state criteria applied to 40.6% of Houston ISD's secondary school population. Nearly half of all Houston ISD high schools (43%) are reporting over half of their entire enrollments as at-risk based on the state criteria. Of the identified at-risk students, 13.9% actually dropped out, compared to 8.8% of the students not identified as at risk. Only 52.1% of the actual dropouts were identified as at-risk. (Research Question 1)

2. All of the state criteria except MAT6 Reading subtest scores were determined to be statistically significant in discriminant function analysis. However, employing the procedure as a test for group membership (dropout vs. non-dropout) yielded only a 17.9% rate for predicted dropouts (n = 2,545). (Research Question 2)

3. Ranking students by number of applicable criteria yields a 23.0% actual dropout rate for students with all four at-risk criteria. This compares favorably to the 13.9% base dropout rate for the total at-risk population. It also has the additional advantage of targeting a relatively small (n = 1,601) portion of the at-risk population as likely dropouts. (Research Question 3)

4. When focusing upon the one criteria that yields the single highest actual dropout rate (Overage for Grade) as a way of identifying a priority subset of at-risk students, two issues emerge. First, the resulting actual dropout rate for these overage students is only 22.0%, slightly less than the rate for students identified on all four criteria. Second, when this 22.0% rate is considered in conjunction with the fact that these overage students constitute 47.0% of the at-risk population (still quite a large number of students), the advantage of this method for determining priority within the at-risk population diminishes. (Research Question 4)

5. The highest degree of predictive reliability for a subset of the at-risk population was obtained by examining individually the fifteen combinations of the four state at-risk criteria. The highest ranking of these combinations has a within group dropout rate of 32.3%, as compared to the 13.9% dropout rate for the total at-risk population. (Research Questions 5 and 6)

We might too easily conclude that the four state criteria HISD currently utilizes in identifying at-risk students do not perform very well either for the district at-large or for individual campuses. Identification rates of over 50% on large secondary campuses with accurate prediction rates in the 15% range would not seem to translate well into effective allocation of intervention resources.

Since we are still required to identify students who display any of the four state at-risk criteria, it would seem reasonable to further explore methodologies for making the best of these criteria. Nevertheless, nearly half of HISD's dropout population will continue to slip through the intervention process unless we expand the domain of at-risk criteria to include additional variables.